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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,688	11/04/2003	Henning Bulow	Q78112	4945
23373	7590	12/20/2007	EXAMINER	
SUGHRUE MION, PLLC			LI, SHI K	
2100 PENNSYLVANIA AVENUE, N.W.				
SUITE 800			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20037			2613	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/699,688	BULOW, HENNING
	Examiner Shi K. Li	Art Unit 2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 10 August 2007 and 10 October 2007.  
 2a) This action is **FINAL**.                            2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1 and 3-21 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1 and 3-21 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 04 November 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_  
 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10 August 2007 has been entered.

### ***Drawings***

2. FIG. 1, FIG. 2 and FIG. 3 are objected to under 37 CFR 1.84(o) because there are no descriptive legends for the boxes. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 10 recites a computer readable medium storing a program for performing a method. The method comprises steps including "splitting the optical signal into parts and providing the signal parts to a respective

branch of at least two branches". However, instant specification does not teach how a program stored in readable medium, when executed by a computer, can split an optical signal into parts. The method further comprises limitation "filtering at least one split optical signal". However, instant specification does not teach how a program stored in readable medium, when executed by a computer, can filter an optical signal. To the understanding of the Examiner, the splitting of optical signal, as taught by instant specification, is done by a splitting unit instead of a computer program.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "a photo diode" in line 4 of the claim and limitation "wherein each waveguide branch fed onto a separate photo diode" in line 13 of the claim. Since instant specification teaches that there are only two photo diodes in the receiver, the photo diode stated in line 4 must be one of the photo diodes mentioned in line 13. The claim fails to particular point out such structure. Similarly, the ADC mentioned in line 5 of the claim must be one of the two ADC unit mentioned in line 14 of the claim. The claim fails to particularly point out such structure.

***Claim Rejections - 35 USC § 102***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 11 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Van den Bergh et al. (European Patent Application EP 0,996,243 A1).

Regarding claim 11, Van den Bergh et al. discloses in FIG. 2 a DSP receiver comprising splitter 6,  $\lambda$ -dependent attenuator 7, photodiodes 8; A/D converters 11 and digital signal processor (DSP) 12.

Regarding claim 21, Van den Bergh et al. teaches in FIG. 2  $\lambda$ -dependent attenuator 7.

***Claim Rejections - 35 USC § 103***

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claims 1, 3 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawarai (U.S. Patent 6,707,963) in view of Jung et al. (U.S. Patent 7,068,949 B2) and Wan et al. (U.S. Patent 7,158,723 B2).

Regarding claim 1, Kawarai discloses in FIG. 6 a wavelength locker comprising splitter for splitting light signal into a plurality of branches, filters 36 and 38, photodiodes 40 and 42, and calculation unit. The difference between Kawarai and the claimed invention is that Kawarai does not teach using digital signal processing (DSP) in the calculation unit. Jung et al. teaches in FIG. 1 the use of A/D converter and microprocessor for digital signal processing data. Wan et al. further teaches in FIG. 4 that a plurality of A/D converters, one for each signal path. One of ordinary skill in the art would have been motivated to combine the teaching of Jung et al. and Wan et al. with the wavelength locker of Kawarai because digital signal processing provides high accuracy and flexibility. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use digital signal processing, as taught by Jung et al. and

Wan et al., in the wavelength locker of Kawarai because digital signal processing provides high accuracy and flexibility.

Regarding claims 3 and 12-13, Kawarai teaches in col. 4, lines 20-23 different filters for 36 and 38. They are spectral filter.

Regarding claim 14, Kawarai teaches a WDM network. It is well known in the art that a WDM network can have over 100 channels each of which can carry 10 Gb/s or more. That is, Kawarai suggests or renders obvious that the modified wavelength locker is provided in a terabit optical network. The Examiner also notes that the additional limitation only constitutes a statement of intended use and does not carry patentability weight.

11. Claims 1, 3, 5-8, 10, 12-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lima et al. (A. Lima, et al., "Polarization Diversity and Equalization for PMD Mitigation in Optical Communication Systems", IEEE International Conference on Acoustics Speech, and Signal Processing, May 13-17, 2002) in view of Agazzi et al. (U.S. Patent Application Pub. 2002/0012152 A 1).

Regarding claims 1 and 6-7, Lima et al. discloses in FIG. 1 a polarization diversity receiver comprising an input, a splitter, a plurality of different polarization beam splitter and a plurality of photodiodes. The difference between Lima et al. and the claimed invention is that Lima et al. does not teach that the signal processing units COMB/EQ and Decision module are A/D converters and DSP. However, Lima et al. teaches on page 2723 that a lot of calculation is needed to process the signal. Agazzi et al. teaches in FIG. 1A to use ADC and DSP for processing optical data signals. One of ordinary skill in the art would have been motivated to combine the teaching of Agazzi et al. with the polarization diversity receiver of Lima et al.

because digital signal process provide fast and accurate result and suitable for signal processing that requires a lot of calculation. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use digital signal processing, as taught by Agazzi et al., in the polarization diversity receiver of Lima et al. because digital signal process provide fast and accurate result and suitable for signal processing that requires a lot of calculation.

Regarding claims 2-3 and 12-13, Lima et al. teaches in FIG. 1 different polarization beam splitters.

Regarding claim 5, Lima et al. teaches in FIG. 3 an additional optical filter in front of the diversity receiver.

Regarding claims 8, 15 and 20, Lima et al. teaches on page 2723, left col. likelihood of mark (bit 1) and space (bit 0).

Regarding claim 10, Lima et al. teaches on page 2723, right col. simulation. It is inherently or obvious to use a computer with computer program for the simulation.

Regarding claim 14, Lima et al. teaches in FIG. 3 that a channel carries 10 Gbit/s. It is well known in the art that a WDM system can have over 100 channels. Together, this gives terabit capacity. The Examiner also notes that the additional limitation only constitutes a statement of intended use and does not carry patentability weight.

Regarding claims 16-17, Lima et al. teaches in FIG. 1 different polarization beam splitters.

Regarding claim 19, Lima et al. teaches in FIG. 3 an additional optical filter in front of the diversity receiver.

12. Claims 4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lima et al. and Agazzi et al. as applied to claims 1, 3, 5-8, 10, 12-17 and 19-20 above, and further in view of Al-Araji et al. (U.S. Patent 6,559,756 B2).

Lima et al. and Agazzi et al. have been discussed above in regard to claims 1, 3, 5-8, 10, 12-17 and 19-20. The difference between Lima et al. and Agazzi et al. and the claimed invention is that Lima et al. and Agazzi et al. do not teach field program gate array (FPGA). Al-Araji et al. teaches in col. 6, lines 37-40 that DSP circuit could be implemented with FPGA. Where the claimed differences involve the substitution of interchangeable or replaceable equivalents and the reason for the selection of one equivalent for another was not to solve an existent problem, such substitution has been judicially determined to have been obvious. See *In re Ruff*, 118, USPQ 343 (CCPA 1958). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use FPGA as DSP circuit.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lima et al. and Agazzi et al. as applied to claims 1, 3, 5-8, 10, 12-17 and 19-20 above, and further in view of Chouly et al. (U.S. Patent Application Pub. 2004/0017857 A1).

Lima et al. and Agazzi et al. have been discussed above in regard to claims 1-3, 5-8, 10, 12-17 and 19-20. The difference between Lima et al. and Agazzi et al. and the claimed invention is that Lima et al. and Agazzi et al. do not teach a MAP algorithm. Chouly et al. teaches a MAP algorithm (see paragraph [0106]). One of ordinary skill in the art would have been motivated to combine the teaching of Chouly et al. with the modified polarization diversity receiver of Lima et al. and Agazzi et al. because MAP algorithm minimizes errors. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use MAP

algorithm, as taught by Chouly et al., in the modified polarization diversity receiver of Lima et al. and Agazzi et al. because MAP algorithm minimizes errors.

*Response to Arguments*

14. Applicant's arguments filed 10 August 2007 have been fully considered but they are not persuasive.

Regarding the rejection of claim 10 under 35 U.S.C. §112, the Applicant argues that instant specification states on page 6 “the invention is also realized in a software program for performing the method described above” and such statement, together with claim 10 provides ample support for the claim. The Examiner disagrees. As the Examiner points out in the rejection, the Examiner does not understand how a computer, by executing a program, can split an optical signal into parts and provide the signal parts to a respective branch of at least two branches. For example, the programming language Python has a built-in command named `string.split()`. However, the command splits a string into two parts. The command cannot split an optical signal into parts. The Applicant may have realized the method in a software, however, the realization has not been disclosed in instant specification and, therefore, claim 10 is not enabled.

Regarding claim 11, the Applicant argues that EP '243 fails to teach “the first waveguide branch does not have the optical filtering element and the DSP processing unit analyzes the first split part for intensity information of the whole optical signal”. The Examiner disagrees. Van den Bergh et al. teaches in FIG. 2 that one branch of the splitter 6 is coupled directly to photodetector 8 and the DSP12 analyzes this part for intensity information of the whole optical signal.

Regarding claim 1, the Applicant argues that Kawarai does not disclose “a splitting unit splitting the optical signal received by the receiver input”. The Examiner disagrees. Kawarai discloses in FIG. 6 a wavelength locker comprising splitter for splitting light signal into a plurality of branches. Furthermore, Kawarai teaches in FIG. 6 filter (A) and filter (B).

Regarding the rejection based on Lima et al. and Agazzi et al., the Applicant argues that Lima does not teach or suggest “wherein different types of filtering process are executed in each waveguide branch”. The Examiner disagrees. Lima et al. teaches in FIG. 1 a power splitter that splits optical signal into three branches. The first branch (counting from the top) is filtered with a LPBS, the second branch is filtered with a quarter-wave plate and a L+45 PBS, and the third branch is filtered with a L+45 PBS. The three branches are filtered with different types of filtering process and read on claim 1.

Regarding claims 15 and 20, the Applicant argues that Lima does not disclose or suggest “wherein the DSP processing unit is configured to correlated information of all waveguide branches to determine one of most likely transmitted bit pattern of the optical signal and numbers for the probability of 0 and 1 in the transmitted bit pattern of the optical signal”. The Examiner disagrees. Lima et al. teaches on page 2723, left col. likelihood of mark (bit 1) and space (bit 0).

The Applicant argues that Al-Araji is not analogous art. The Examiner disagrees. Since Al-Araji et al. deals with communication systems and teaches DSP, which is recited in claimed invention, it is analogous art.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (7:30 a.m. - 4:30 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

skl  
13 December 2007



Shi K. Li  
Patent Examiner